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Internal Finance and Investment

Another Look

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Firms rely on internal finance for capital expenditures because of managerial considerations instead of information-theoretic considerations. That is, rather than maximizing the market value of the firm, managers seem more interested in objectives like sales maximization, size of the firm, and perquisites.

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Summary findings

One of the best documented empirical facts in economic research has been the positive relationship between internal finance and cash flows — the sum of retained earnings and depreciation — and capital expenditures and investment. But disputes about the analytical basis for the cash flow theory have been largely unresolved.

There are two distinct approaches to the cash flow theory of investment: the managerial and information-theoretic approaches. The premise of the managerial approach is that managers are primarily interested in maximizing the growth rate of the firm. The premise of the information-theoretic approach is that managers try to maximize shareholder value.

Using a panel of U.S. manufacturing firms (1972–90), Samuel tries to distinguish between these two approaches on the basis of observed firm characteristics. The results suggest that firms rely on internal finance for capital expenditures because of managerial considerations rather than information-theoretic considerations.

The principal shortcoming of the information-theoretic approach is its reliance on dividend practices as the decisive criterion for studying firm heterogeneity. But dividend practices are incapable of distinguishing between managerial and information-theoretic approaches since both approaches predict a negative relationship between dividend payout ratios and capital expenditures.

But one can distinguish between managerial and information-theoretic approaches using such variables as size, exchange listings, and the ratio of R&D to sales and make contrasting predictions about the firm's reliance on internal finance for capital expenditures.

The evidence shows that the firm's observed reliance of capital expenditures on internal finance is driven by managerial rather than information-theoretic considerations.

While no current research directly distinguishes between managerial and information-theoretic approaches, preliminary evidence seems to favor the managerial approach. And even though the stock market may play a limited role as a source of finance, policy initiatives to reform the financial sector and develop capital markets are likely to enhance the overall efficiency of the resource allocation process in the economy.

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Internal finance and Investment: Another Look*

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Internal finance and Investment: Another look

The positive relationship between internal finance/cash flows--the sum of retained earnings and depreciation--and capital expenditures/investment is one of the best documented empirical facts in economic research. However, the analytical basis for this positive relationship has been a matter of great dispute and a largely unresolved issue. Briefly speaking, the underlying cash flow theory of investment that leads to the positive relationship consists of two distinct approaches, viz. managerial and information-theoretic approaches to investment. This paper attempts to distinguish between these two approaches on the basis of observed firm characteristics, based on a panel of U.S. manufacturing firms for the 1972-1990 period taken from Standard and Poor's COMPUSTAT database. The results suggest that the observed reliance of firms on internal finance for capital expenditures is due to managerial rather than information-theoretic considerations. The paper is organized into two main sections. Section I considers the analytical issues and section II presents the empirical evidence and discusses the implications for developing countries.

I

Investment theories and the role of finance

It is well-known that prior to the ascendancy of the Modigliani-Miller (1958) theorems and the neoclassical theory of investment, liquidity theory of investment had replaced the accelerator theory of investment as the leading explanation of investment decisions of firms.[1]

[1] The neoclassical theory of investment is due to Jorgenson and associates (1963, 1966, 1967, 1971), primarily based on the neoclassical theory of optimal capital accumulation. The liquidity theory is due to Meyer and Kuh (1957), Duesenberry (1958), Kuh (1963) and others. The accelerator theory, the oldest of the investment models, is due to Clark (1917), Chenery (1952), Koyck (1954), Eisner (1964) and others. The managerial nd information-theoretic approaches to investment can be considered as the versions of the liquidity theory and therefore fall under the rubric of cash flow theory of investment.

There were at least two justifications for the liquidity theory: (i) realized profits measure expected profits and investment is governed by profit expectations (Tinbergen, (1938)); and (ii) investment may be constrained by the supply of funds (Meyer and Kuh (1957)), Meyer and Glauber (1964), Kuh (1963), Dusenberry (1958), and Meyer and Strong (1990)).

In the strong version of the liquidity theory, the financial constraint operates at all times; the cost of funds schedule becomes inelastic where internal funds are exhausted. In the weaker version, financial constraint operates at low rates of capacity utilization while extreme pressure on capacity may result in the use of outside sources of finance.

The neoclassical theory of investment is based in part on the Modigliani-Miller (1958) theorems in finance. The neoclassical view assumes that as long as the firm has profitable investments with returns above the cost of capital, the firm can obtain sufficient funds to undertake them. Consequently, internal and external finance are viewed as substitutes; firms could use external finance to smooth investment when internal finance fluctuates. In a broader sense, the neoclassical view also implies a complete dichotimization of the real and financial decisions faced by the firm.

On the other hand, cash flow theories of investment emphasize financing hierarchy faced by the firm and therefore the crucial role of cash flows in determining capital expenditures.[2] For instance, the managerial and information-theoretic approaches to investment explicitly consider capital market imperfections that raise the cost of external finance; managerial

[2] According to the financing hierarchy/pecking order hypothesis, the firm's preferred ordering of the sources of finance is: (i) internal finance; (ii) external debt; and (iii) new equity. See Koch (1943), Donaldson (1961), Meyer and Strong (1990) and others for evidence.

discretion considerations lead to a similar outcome in the managerial theory of investment.[3]

Therefore, cash flow is irrelevant for all other models of investment.[4] In particular, the accelerator, modified neoclassical, and Q models of investment make no particular predictions regarding the source of finance. To the extent that these theories are based on the assumption of profit maximization, they can be regarded as consistent with the neoclassical approach. Given these considerations, it is useful to distinguish between the managerial and information-theoretic approaches.

Managerial theory of investment

The managerial approach to corporate behavior directly challenges the assumption of profit maximization by the firm and instead postulates other objectives such as sales, staff, emoluments, market share etc. for managers.[5] Given the separation of ownership and control (management), managerial behavior is discretionary and constrained rather weakly by shareholder-owner interests on the one hand, and by competitive market conditions on the other.[6]

The key result of the managerial approach is that firms aim for greater output levels and faster growth than is consistent with maximizing the current stock market value of the

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[3] Financing hierarchy may also be based on transactions costs, tax advantages, costs of financial distress etc., though these are likely to be less important than agency problems and asymmetric information.

[4] See Chirinko (1993) for a comprehensive survey of the current state of research on investment theory, with particular emphasis on the Q-theoretic models.

[5] Strictly speaking, the managerial theory of investment can be thought of as being made up of two types of approaches--managerial capitalism and agency theory. Baumol (1959, 1967), Marris (1963, 1964), Grabowski and Mueller (1972) and others are examples of the managerial capitalism approach. The agency cost approach focusses on contracting aspects within the overall framework of the principal-agent model and is associated with Jensen and Meckling (1976) and others.

[6] The literature on the separation of ownership and control began with Berle and Means (1932).

corporation, taken as a proxy for stockholder welfare. The extent of managerial discretion to do this depends upon a minimum profit constraint imposed by the capital market, or upon sustaining a market value high enough to forestall a disciplinary takeover bid in the market for corporate control.

In the managerial theory of the firm, the fundamental determinant of investment is the availability of internal finance. Managers are envisaged as pushing investment programs to a point where their marginal rate of return is below the level that would maximize stockholder welfare; in other words, managers indulge in overinvestment. For these purposes, internal finance is particularly favored since they are the most accessible part of the capital market and most amenable to managerial desires for growth. In other words, professional managers may avoid relying on the external finance because it would subject them to the discipline of the external capital market. In contrast, the level of cash flow is irrelevant for the firm's investment decisions in neoclassical theory; what matters is the cost of capital.

While managers want to maximize their utility, shareholders want them to maximize the value of the firm. Various control mechanisms like the board of directors, market for corporate control, and large shareholders may limit this divergence of interests. Managers who can be replaced by the board, through hostile takeovers, or due to pressure from large outside shareholders should be attentive to shareholder concerns. In some firms however, these control mechanisms may be ineffective. Their managers can maximize their utility with impunity. Such managers are said to be "entrenched".

Holding constant the manager's absolute investment in the firm, increases in the fraction of firm financed by debt increases the manager's share of the equity and mitigate the loss from

the conflict between the manager and the shareholders. Moreover, as pointed out by Jensen (1986), since debt commits the firm to pay out cash, it reduces the amount of "free"cash available to managers to engage in the type of pursuits mentioned above. This mitigation of the conflicts between managers and equity holders constitutes the benefit of debt financing. Grossman and Hart (1982) points out that if bankruptcy is costly for managers, because they lose control or reputation, then debt can create an incentive for managers to work harder, consume fewer perquisites, make better investment decisions, etc., because this behavior reduces the probability of bankruptcy.

Information-theoretic approach

In asymmetric information models, firm managers or insiders are assumed to possess private information about the characteristics of the firm's return stream or investment opportunities. Myers and Majluff (1984) showed that, if outside suppliers of capital are less well-informed than insiders about the value of the firm's assets, equity may be mispriced by the market. In particular, the market may associate new equity issues with low-quality firms. If firms are required to finance new projects by issuing equity, underpricing may be so severe that new investors capture more than the Net Present Value (NPV) of the new project, resulting in a net loss to existing shareholders. In this case, the project will be rejected even if its NPV is positive. This underinvestment can be avoided if the firm can finance the new project using a security that is not so severely undervalued by the market. For example, internal funds and/or riskless debt involve no undervaluation, and therefore, will be preferred to equity. Myers (1984) refers to this as a "pecking order" theory of financing, i.e., that capital structure will be driven by firms' desire to finance new investments, first internally, then with low-risk debt, and finally

with equity only as a last resort.

Based on these considerations, the information-theoretic approach to the study of investment also implies a positive relationship between cash flows and investment; in fact, this positive relationship is also seen as evidence of liquidity constraints faced by firms. Consequently, external finance and internal finance are not perfect substitutes for the firm, as predicted by the Modigliani-Miller (1958) theorems and the neoclassical theory of investment. Therefore, in a world of heterogenous firms, financing constraints would influence the investment decisions of firms. In particular, investment may depend on financial factors, such as the availability of internal finance, access to new debt or equity finance, or the functioning of particular credit markets.

Fazzari et al. (1988) have shown that the issue of firm heterogeneity can be explored further by classifying firms on the basis of retention practices which identify firms that are most likely to face capital market constraints due to informational problems. The rationale for the classification is as follows; if internal and external finance are nearly perfect substitutes, retention practices should reveal little about investment activity by the firm. The availability of internal funds should constrain investment if and only if the firm has to pay a premium for new debt or equity finance. The results reported in Fazzari et al. (1988) indicate a substantially greater sensitivity of investment to cash flows in firms that retain nearly all of their income. This statistically and economically significant difference was also found to be robust to a wide variety of model specifications and estimation techniques.

Hoshi et al. (1991) adopted a similar procedure by dividing a sample of Japanese companies into two groups according to whether the firm had a close institutional relationship

with a bank or not. The rationale for doing this was that liquidity constraints arising from asymmetric information may be less important where the bank maintains a close relationship with the firm. They found that the q ratio--the ratio of market value of the firm to the replacement cost of capital--was more significant, and cash flow less significant, for the firms that were closely related to banks.[7]

Discussion

(i) In the cash flow models of investment, internal finance is generally viewed as a constraint on the volume of investment expenditures rather than as a determinant of the optimal capital stock. Therefore, there is no role for capital-labor substitution in cash flow models, unlike the neoclassical model of investment.

(ii) It is often difficult to distinguish between the role of cash flow as a measure of the expected profitability of investment from its role as a measure of the availability of funds for investment. It is this latter aspect that is generally intended for measurement, and through which the liquidity effect is thought to operate. In the information-theoretic approach for instance, an increase in cash flow would increase investment; but, since increases in cash flow are likely to be highly correlated with increases in profitability, it is hard to tell if the increased investment is not primarily the result of increased profitability rather than increased cash flow. One solution--proposed by Fazzari et al. (1988)--is to use the Q ratio as a measure of the expected profitability

[7] However, it should be pointed out that this evidence is consistent with the predictions of managerial theory as well. In the case of firms that maintain a close relationship with banks, agency costs are likely to be lower because of closer monitoring by banks. For these firms with low agency costs, cash flow is likely to be less significant; in other words, the reliance on internal finance is likely to be low for these firms with close relationship with banks. Therefore, the finding that cash flow is less significant for firms that maintain a close relationship with banks is consistent with information-theoretic as well as managerial approaches to investment.

and cash flow as a measure of the availability of funds.

(iii) Even though the information-theoretic approach assumes the prevalence of capital market constraints and therefore the preference of firms for internal finance, it is cast in a neoclassical framework with the usual assumption that managers act in the interests of shareholders and maximize profits. On the other hand, managerial theory is based on the premise that managers have objectives different from those of shareholders. Managers do not maximize profits/ shareholder wealth, but instead maximize the growth rate/size of the firm and are probably more concerned about managerial perquisites.

(iv) In the information-theoretic approach, it is assumed that funds are invested at rates of return above shareholder opportunity costs. This is an outcome of the assumption that managers act in the interests of shareholders. In the managerial model however, investment could take place at rates of returns below opportunity cost.[8] This is because managers have objectives that are different from those of shareholders. Therefore, the policy implications of the two approaches are drastically different. In particular, overinvestment by managers is not an issue in the information-theoretic approach, while it is a matter of central concern in the managerial theory.

(v) In the information-theoretic view, a financing hierarchy exists because of asymmetric information between managers and outside suppliers of finance. As demonstrated by Myers and Majluff (1984), firms are faced with a skeptical capital market that pays less for new equity than its true value, since the market cannot fully learn the expected return on the firm's investment. In the managerial view however, financing hierarchy exists because managers can use internal

[8] See Mueller and Reardon (1993) for recent evidence. Brainard et al. (1980) also found that substantial volume of investment in the U.S. economy had been undertaken below the opportunity cost of capital, which is inconsistent with the predictions of the neoclassical theory.

funds at their discretion and thus implicitly face a low opportunity cost on them.

(vi) The central issue in the managerial theory of investment is the prevalence of managerial discretion; internal finance is important for investment decisions precisely because of this since managers are averse to the dictates of the external capital market. On the other hand, the information-theoretic approach to investment emphasizes the role of asymmetries in information and essentially views managerial discretion as an aspect of asymmetric information; internal finance is important for investment because of the prevalence of asymmetric information. The common ground between the two approaches with regard to this issue lies in recognizing the fact that it is the separation of ownership and control that generates information asymmetries in the first instance, which in turn leads to discretionary managerial behavior.[9]

Given these considerations, the discussion in this paper is focussed on distinguishing between the managerial and information-theoretic approaches to capital expenditure decisions at the firm-level. Above all, this distinction between managerial and information-theoretic approaches is important in addressing the empirical issue of why internal finance is so important for the firm's investment decisions.

It is interesting to note that, starting with the work of Fazzari et al. (1988), the consensus in the literature on the cash flow theory of investment seems to emphasize asymmetries of information as the principal force behind the observed positive relationship between internal finance and investment. However, the present study emphasizes the fact that the cash flow theory of investment is also driven by managerial considerations and therefore tries

[9] Stultz (1990) presents a model in which managerial discretion and information asymmetries exist simultaneously.

to distinguish between the two approaches on the basis of observed firm characteristics. This is an important point of departure for the present study from previous research.

Additionally, while earlier studies distinguished between information-theoretic and managerial approaches on the basis of *different* firm attributes, firm attributes have been so chosen in the present study that they will generate contrasting predictions and help to discriminate between information-theoretic and managerial approaches. For instance, Oliner and Rudebusch (1993) used age, exchange listing, and stock trading behavior by insiders as proxies for the information-theoretic approach and the share of outstanding common stock controlled by the firm's board of directors and the percentage of outside shares controlled by the twenty largest outside shareholders as proxies for the managerial (agency cost) approach and found that the source of financing hierarchy faced by the firm is due to information-theoretic rather than agency cost considerations.

Blanchard et al. (1994) distinguished between the perfect capital markets model, asymmetric information model, and agency model by looking at a sample of eleven U. S. firms that received a cash windfall which did not change its investment opportunity set. By evaluating the behavior of these firms with regard to various activities such as investment in own lines of business, diversification, divestiture, dividends or open market share repurchases, managerial compensation, and long-term debt, Blachard et al. (1994) find that the evidence was broadly inconsistent with the perfect capital markets model. Also, the results need to be considerably stretched to fit the asymmetric information model in which managers act in the interest of shareholders. However, the evidence supports the agency model of managerial behavior, in which managers try to ensure the long-term survival and independence of firms with themselves

at the helm.

Hubbard et al. (1995) take a somewhat different approach to distinguish between Jensen's (1986) "free cash flow models" (managerial approach) and the information-theoretic approach. They contrast the behavior of a set of mature firms in their sample with other firms and find that the investment decisions of firms are well described by a standard Euler equation. Therefore, Hubbard et al. (1995) conclude that while the Jensen-style agency model may well be important in explaining other uses of the firm's resources, it does not appear to be important for business fixed investment.

Aspects of firm heterogeneity

Given the different motivations of the managerial and information-theoretic approaches to investment for emphasizing the firm's reliance on internal finance for capital expenditures, the two theories hold different predictions for firms with different characteristics. However, it should be noted that, in the discussion that follows, no attempt is made to distinguish between the debt and equity components of external finance based on firm characteristics. This is due to the fact that both information-theoretic and managerial approaches posit the existence of a financing hierarchy wherein the cost of equity is higher than the cost of debt.[10]

The fundamental distinction made between firms in this paper is in terms of mature vs non-mature (dynamic) firms. Broadly speaking, mature firms are old, slow-growing firms with limited investment opportunities; in contrast, dynamic firms are young, fast-growing firms with abundant investment opportunities. As discussed in greater detail below, observable firm

[10] The effect of information asymmetries on the market for new shares is examined by Myers and Majluff (1984) through an extension of Akerloff's (1970) lemons argument. Similarly, Stiglitz and Weiss (1981) have shown that debt markets are also vulnerable to adverse selection problems because of asymmetric information about risk characteristics and default probabilities.

characteristics have been used to classify firms into mature/dynamic categories. The basic prediction of the information-theoretic approach is that information problems are likely to be the least for mature firms and the most for dynamic firms. In contrast, the managerial approach implies that agency problems are likely to be the most for mature firms and the least for dynamic firms. Further, arguments presented earlier imply that firms that are subject to greater incidence of information problems and agency costs are likely to be more dependent on internal finance than external finance. In what follows, firms are divided into the mature/non-mature categories based on characteristics such as size, dividend practices, exchange listing, and R and D to sales ratio; these predictions are discussed in detail in the context of a cross-section of firms.[11] The predicted relationship between internal finance and capital expenditures for firms with different characteristics, based on managerial and information-theoretic approaches, is summarized in table 1. The rationale for these predictions is discussed in greater detail below.[12]

(a) size: Gertler (1988) has argued that information-based financial constraints are likely to have a greater impact on small firms than large firms, partly because large firms tend to be mature and have more credible relations with providers of finance. The information-theoretic approach therefore implies that small firms are likely to be most dependent on internal finance and least dependent on external finance.

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[11] Other firm characteristics like growth rate of sales and the price-earnings ratio were also considered in splitting the sample; this was not pursued since they generate equivalent firm behavior from the point of view of information-theoretic and managerial approaches and therefore not useful in distinguishing between them.

[12] It should be noted that Fazzari et al. (1988) used only dividend practices to distinguish between firms. Also, they assumed that internal finance is important for investment because of asymmetric information considerations rather than managerial discretion aspects. Unlike the present study, no attempt was made to distinguish between information-theoretic and agency cost approaches based on observable firm characteristics.

On the other hand, the ownership of small firms is likely to be more concentrated, with managers holding significant blocks of stock, which in turn could mitigate agency problems and align shareholder and managerial interests better. Therefore, managerial theory implies that small firms are likely to be least dependent on internal finance and most dependent on external finance.

These arguments are essentially reversed in the case of large firms.

(b) dividend-practices: According to the information-theoretic approach, observed retention practices and therefore dividend practices, provide a useful criterion for identifying firms that are likely to face relatively high costs of external finance. Fazzari et al. (1988) have shown that if the cost of external finance is significantly higher than that of internal finance, the effect is likely to be greatest for firms that retain most of their income and pay out little dividends. If the cost disadvantage is only slight, then retention (dividend) practices should reveal little about financing practices, or investment behavior. Therefore, firms that pay out the least dividends are the ones that are likely to face the most amount of information problems and liquidity constraints, and hence are likely to be most dependent on internal finance and least dependent on external finance.

According to the managerial theory, since managers are primarily interested in maximizing the growth rate of the firm rather than shareholder value, they would undertake capital expenditures without any cost of capital considerations. Grabowski and Mueller (1972) have shown that this is especially true with regard to internal finance, since the scope for managerial discretion is maximum here. Reliance on internal finance also helps managers to

build financial slack[13] and get away from capital market pressures. One obvious way to maximize internal finance is by way of distributing as little dividends as possible. In other words, managerial theory also predicts that firms with low dividend pay-out ratios are likely to be most dependent on internal finance and least dependent on external finance. Likewise, the agency-cost explanation for dividends offered by Rozeff (1982) and Easterbrook (1984) predict a negative relationship between dividend practices and internal finance. In their view, high dividend pay-outs help to lower agency costs by minimizing the amount of free discretionary cash flow available to the managers; on the other hand, low dividend pay-outs increase the agency costs associated with free cash flow.

These arguments are reversed in the case of firms with high dividend pay-out ratios.[14]

These considerations therefore imply that dividend practices are not sufficient to distinguish between information-theoretic and managerial approaches to the study of the firm's financing choices. As noted before, this also marks a fundamental departure for the present study from the genre of studies following Fazzari et al. (1988) that view dividend practices as the sole basis for dealing with firm heterogeneity in the context of the information-theoretic approach to investment.

(c) exchange listing: Oliner and Rudebusch (1993) have proposed the use of the firm's exchange listing as an alternative measure of its maturity. This is especially useful, since the age of the

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[13] Financial slack is defined as the difference between internal finance and capital expenditures and shows how far the firm can avoid external finance while undertaking capital expenditures.

[14] It should be emphasized that this relationship is not merely a restatement of the negative relationship between dividend pay-out and retained earnings (internal finance) in an accounting sense. Note that Dividends + Retained Earnings = Net Income. Therefore, (Dividends/Net Income) + (Retained Earnings/Net Income) = 1. The argument here is basically about why internal finance as a source of finance should matter for some types of firms.

firm is not reported in COMPUSTAT. Exchange listing refers to whether the firm's common stock trades over the counter (OTC) or on other stock exchanges like the New York Stock Exchange (NYSE) or the American Stock Exchange (ASE)--non-OTC firms. When firms go public initially, their stock is issued over the counter, as they usually cannot meet the listing requirements of the major exchanges.[15] According to the information-theoretic approach, compared to non-OTC firms, OTC firms are more likely to be less mature firms that may face more asymmetries of information between managers and outside suppliers of finance. Consequently, OTC firms should be most dependent on internal finance and least dependent on external finance, holding everything else constant.

Previous research found that OTC firms tend to experience more asymmetric information than Fortune 500 companies because they are typically smaller, have more of their value in intangible assets, and receive less attention from investment analysts (Chari et al. (1988), Lin and Howe (1990)).

On the other hand, managerial theory argues that since OTC firms are more likely to be younger, smaller, and fast-growing, agency costs are likely to be lower for them compared to non-OTC firms. Consequently, OTC firms should be least dependent on internal finance and most dependent on external finance. This prediction is based on the findings of Mueller (1972). While testing the life cycle theory of the firm, Mueller (1972) has shown that young, dynamic firms with attractive investment opportunities are more likely to use external finance while old, mature firms with limited growth opportunities are largely dependent on internal finance.

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[15] Listing requirements for NYSE currently include: a corporation must have a minimum of one million publicly held shares with a minimum aggregate market value of $16 million as well as net income topping $2.5 million before federal income tax.

These arguments are reversed in the case of non-OTC firms.

(d) R and D to sales ratio: According to the information-theoretic approach, asymmetries of information between insiders and outsiders are likely to be the greatest in the case of firms with high R and D to sales ratios. These firms should therefore be most dependent on internal finance and least dependent on external finance.

For instance, Arrow (1962) has argued that moral hazard problems hinder the external financing of highly risky business activities like innovation. More recently, Stiglitz and Weiss (1981) and Myers and Majluff (1984) have developed formal models of moral hazard and adverse selection in the context of external finance--debt as well as equity--which is especially relevant for R and D investments. These problems of adverse incentive and selection problems are compounded by the absence of collateral value of investments like R and D.[16]

On the other hand, managerial theory argues that conflicts between shareholders and managers are likely to be least for technologically progressive, dynamic firms with high R and D to sales ratios and attractive growth opportunities.[17] These firms should therefore be least dependent on internal finance and most dependent on external finance.

These arguments are reversed in the case of mature firms with low R and D to sales ratios.

Regression

The predictions outlined above can be tested by running regression eq. 1 shown below, based on Fazzari et al. (1988), for two groups of firms divided on the basis of median values

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[16] The importance of collaterizable net worth has been emphasized by Bernanke and Gertler (1989), among others.

[17] This prediction is based on Mueller's (1972) life cycle theory of the firm.

of size and R and D to sales ratio; firms have been also split on the basis of their exchange listing.[18]

$$I/K = \beta_0 + \beta_1 Q + \beta_2 (CF/K) + \beta_3 (S/K) + \epsilon \qquad (1)$$

where Q is the q ratio, CF is cash flows, S is sales, and K is the replacement cost of capital. In this specification, Q is regarded as a measure of expected profitability, CF is a measure of the availability of funds, and S shows current demand conditions.[19] As noted before, this is also a convenient strategy to distinguish between the role of cash flows as a measure of expected profitability and as a measure of the availability of funds. All the coefficients in this specification are expected to be positive.

II

Results

The empirical results are based on a panel of 603 manufacturing firms from the Standard and Poor's COMPUSTAT database for the 1972-1990 period; the sample excludes firms that were involved in major mergers representing contribution to sales exceeding 50 percent of the acquiring firm's net sales for the year in question. The q ratio has been computed following the methodology outlined in Salinger and Summers (1983).

Regressions[20] were run for eq. 1 after splitting the sample on the basis of median values

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[18] Dividend pay-out ratio was not used to split the sample, since it is not useful in distinguishing between managerial and information-theoretic approaches.

[19] It should be noted that in addition to sales, Fazzari et al. (1988) also used the desired capital stock term from neoclassical theory to model the demand side and still found the cash flow term to be significant.

[20] In general, the relationship is specified as

$Y_{it} = \beta_0 + \beta_{it} X_{it} + \alpha_i + v_t + e_{it}$ where α_i is the individual firm effect and v_t is the year effect. The standard approach for sweeping out fixed effects, by transforming variables to deviations from

of size and R and D to sales ratio; firms were also divided on the basis of their exchange listing. These results are shown in table 2.

(i) all firms: For all firms, the right hand side variables of the regression are significant; except for sales, all the signs are as expected. As shown by Schiantarelli and Gerogoutsos (1990), the negative sales coefficient could reflect the effect of monopolistic markets rather than the accelerator effects associated with positive sales coefficients.[21]

(ii) size: Based on median values of firm size, larger firms are much more dependent on internal finance than smaller firms. This provides broad support for the managerial approach to investment rather than the information-theoretic approach. In the case of the small firms, sales--proxying for future demand--does not seem to be a factor, while it does matter for large firms. Also, the q ratio is significant for all firms, implying that future profitability does matter for capital expenditures.

(iii) exchange listing: The cash flow effect is much more important and stronger for non-OTC firms, compared to OTC firms. This is consistent with the predictions of the managerial approach and contrary to the information-theoretic approach. For non-OTC firms, sales and q ratio matter, while they do not matter for OTC firms.

These results can also be viewed as being consistent with those based on size (ii) if one thinks of OTC firms as being smaller than non-OTC firms.

(iv) R and D to sales ratio: In the case of firms divided on the basis of median R and D to sales

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their firm-specific means, has been used in this paper. These estimates are also referred to as the "within-group" estimate in the literature. See Hsiao (1986) for a more detailed discussion of this approach.

[21] Devereaux and Schiantarelli (1990) also report negative output coefficients. However, Fazzari et al. (1988) and Oliner and Rudebusch (1992) report positive sales coefficients.

ratio, mature firms are more dependent on internal finance than dynamic firms. This is again consistent with the predictions of the managerial approach and counter to the information-theoretic approach.

On balance therefore, when firms are divided on the basis of size, exchange listing, and R and D to sales ratio, the evidence turns out to be more favorable for the managerial approach compared to the information-theoretic approach. In other words, the observed reliance of the firm's capital expenditure decisions on internal finance is indeed driven by managerial rather than information-theoretic considerations. Therefore, the evidence in this paper is broadly consistent with the results of Blanchard et al. (1994) who adopt a somewhat different approach to distinguish between the perfect capital markets model, asymmetric information model, and the agency model of managerial behavior and find the evidence as favoring the agency model.

It is important to emphasize that these findings connote an important departure from the findings in the literature following the Fazzari et al. (1988) study. In these studies, the firm's observed reliance on internal finance for investment decisions has been attributed to information-theoretic considerations. However, as argued in this paper, this reliance on internal finance could and in fact does stem from managerial-theoretic considerations. As discussed before, the principal shortcoming of the information-theoretic literature is its reliance on dividend practices as the decisive criterion for studying firm heterogeneity. However, this approach is flawed because, as shown in the present paper, dividend practices are incapable of distinguishing between managerial and information-theoretic approaches, since both approaches predict a negative relationship between dividend pay-out ratios and capital expenditures. On the other hand, variables such as size, exchange listing, and R and D to sales ratio are adequate to

distinguish between managerial and information-theoretic approaches since it is possible to make contrasting predictions for the firm's reliance on internal finance for capital expenditures based on these variables.

Regressions with interactions (tables 3, 4)

The issue of firm heterogeneity can be explored further by running regressions that include an interaction term between cash flow and firm characteristics. In particular, this approach is useful in checking the consistency of the regression results shown in table 2 and discussed in the previous section. The new results are shown in table 3.

The interaction of size with cash flow is significant and positive. This is therefore consistent with the earlier finding that large firms are more dependent on internal finance. The interaction term between exchange listing[22] and cash flow is negative and significant. This implies that OTC firms are less dependent on internal finance than non-OTC firms. This is similar to the evidence noted before and consistent with the predictions of the managerial approach and counter to the information-theoretic approach. The interaction between the R and D to sales ratio and cash flow is not significant. These conclusions are also not changed when all the interactions are considered simultaneously except that the R and D interaction term becomes negative and significant and therefore lends more support for the managerial theory (table 4).

Therefore, the evidence from regressions with interactions reinforce the earlier findings from regressions based on splitting the sample using firm characteristics. These results therefore

[22] In this specification, exchange listing is proxied by a dummy variable that takes on a value of one for OTC firms and zero for non-OTC firms.

suggest that the observed reliance of the firm's investment on internal finance is driven by managerial rather than information-theoretic considerations.

Conclusions and Discussion

While the positive relationship between internal finance and investment is a well-known fact in economic research, the analytical basis for the underlying cashflow theory has been an unresolved issue. Beginning with Fazzari et al. (1988), the consensus in the literature seems to be that the firm's observed reliance on internal finance for capital expenditures is due to information-theoretic considerations. However, as demonstrated in this paper, this reliance on internal finance could, and in fact does, stem from managerial-theoretic considerations. In that sense, the findings in this paper connote a fundamental departure from the evidence in the literature so far. The principal shortcoming of the information-theoretic literature is its reliance on dividend practices as the decisive criterion for studying firm heterogeneity. However, this approach is flawed because dividend practices are incapable of distinguishing between managerial and information-theoretic approaches, since both approaches predict a negative relationship between dividend pay-out ratios and capital expenditures. On the other hand, variables such as size, exchange listing, and R and D to sales ratio are adequate to distinguish between managerial and information-theoretic approaches since it is possible to make contrasting predictions for the firm's reliance on internal finance for capital expenditures based on these variables. Finally, the results in this paper are broadly consistent with that of Blanchard et al. (1994) that examined a variety of firm decisions to distinguish between alternative theories of corporate financing and investment and found support for the agency model of managerial behavior rather than the perfect capital markets model and the asymmetric information model.

What then are the implications of these findings for developing countries? It is interesting to start this discussion by noting that the empirical testing of the alternative models of investment in developing countries have been confined to accelerator, neoclassical, and the cash flow models. The Q theory of investment has not been in this mix given the rather exacting data requirements for the computation of the Q ratio. Overall, the evidence for the developing countries have favored the cash flow theory of investment.[23]

While there exists no current research that directly distinguishes between managerial and information-theoretic approaches that underpin the cash flow theory of investment for developing countries, there are some interesting pointers. For instance, based on a detailed comparison of U. S. and Indian firms, Samuel (1996) has shown that apriori, information and agency problems are likely to be less severe for Indian firms compared to U. S. firms, given that the Indian financial system is predominantly a bank-oriented one compared to the U. S. stock market-oriented system. Further, the analysis of the financing of project costs for existing and new Indian firms suggested that internal finance and debentures played a much greater role in project financing for existing firms, while external equity and loans from All-India Financial Institutions[24] played a much greater role for new companies. Since agency costs are likely to

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[23] See Athey and Laumas (1994) for India, Harris et al. (1994) for Indonesia, Jaramillo et al. (1993a, 1993b) for Ecuador, Nabi (1989) for Pakistan, and Tybout (1983) for Colombia. Also, Bilsborrow (1977) found support for accelerator and cash flow theories using panel data for manufacturing firms in Colombia.

[24] There are three All-India Development Banks: Industrial Development Bank of India (IDBI), Industrial Finance Corporation of India (IFCI), and Industrial Credit and Investment Corporation of India (ICICI). In addition to IFCI, ICICI, and IDBI, Industrial Reconstruction Bank of India (IRBI) also provides long-term finance to Indian corporations. Unit trust of India (UTI), Life Insurance Corporation of India (LIC), and General Insurance Corporation of India (GIC) also provide financial assistance and take equity positions in Indian companies. In addition, there are state-level financial institutions (SFCs, SIDCs) that provide long-term finance to Indian companies.

be greater for existing firms than new firms, the greater reliance of existing firms on internal finance can be viewed as broadly supportive of the managerial theory of investment in the Indian context. In contrast, the information-theoretic approach to investment would have predicted existing firms to be less dependent on internal finance than new firms since information problems are likely to be less for existing firms than new firms.

This finding is also consistent with the evidence in Singh and Hamid (1992), Athey and Laumas (1994), and Cobham and Subramniam (1995) who find internal finance to be relatively more important for large Indian firms than small firms. Given that existing firms are likely to be bigger than new firms (that are usually small), this result can be seen as strengthening the case for the managerial theory of investment in the Indian context. Further, Athey and Laumas (1994) found internal finance to me more important for firms that produce luxury goods than essential goods. Given that R and D expenditures for firms producing luxury goods are likely to be lower than for firms producing essential goods and given that agency costs are likely to be higher as well, this evidence again seems to support the managerial theory of investment in the Indian case.

It is also interesting to consider the implications of these results for the efficiency of the overall resource allocation process in the economy, where efficiency can be measured by the rate of return on investment. Under the neoclassical theory of investment, the return on investment for firms with different mixes of internal and external finance should be similar since internal and external finance are regarded as substitutes. In contrast, under the cash flow theories--the managerial and information-theoretic approaches--the return on investment by firms with different mixes of internal and external finance should be different, since internal and external

finance are not considered substitutes. In particular, firms that use external capital markets and hence are subject to their discipline could be expected to utilize resources more efficiently than firms that are more reliant on internal finance; this is also known as the "capital market pressure" hypothesis in the literature. Jensen (1986) argues that the constant scrutiny by the capital market is an efficiency-enhancing device that keeps managerial discretion to a minimum, best exemplified perhaps by leveraged buy-outs. In the extreme, there are firms that fund all investment out of internal finance alone as well as firms that use external finance consistently.

Samuel (1995) has investigated the relationship between returns on investment and the financing mix of firms. The evidence from the regressions supported the predictions of the cash flow theories in that firms that were more dependent on external finance attained higher rates of return on investments than firms that were more dependent on internal finance. To that extent, these results support the capital market pressure hypothesis and therefore implies that the overall resource allocation process is likely to be efficient. In other words, even though firms are primarily dependent on internal finance and therefore are not subject to the constant scrutiny of capital markets that would have come from a greater reliance on external finance, the attendant resource allocation process is none the less efficient. Again, from the perspective of developing countries, this result suggests that even though the stock market plays a limited role as a source of finance[25], policy initiatives to reform the financial sector and develop capital markets can enhance the overall efficiency of the resource allocation process in the economy.

However, there is a caveat to this conclusion. As noted earlier, while the information-theoretic approach is based on the premise that managers maximize shareholder value, the

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[25] See Samuel (1996) and Cobham and Subramaniam (1995) for evidence regarding India.

managerial approach assumes that managers are more interested in objectives like sales maximization, size of the firm, and perquisites rather than the market value of the firm. Given that the results in this paper support the managerial approach than the information-theoretic approach, it could well be that overinvestment by old, mature firms could displace investment by young, dynamic firms at or above the market discount rate. Consequently, the allocation of resources in the economy implied by the managerial theory of investment can be considered inefficient from the point of view of social welfare.[26]

[26] See Mueller (1972) and Friedman and Laibson (1989) for a more detailed discussion.

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Table 1: Predicted relationship between internal finance and capital expenditures

Firm characteristics	Information-theoretic approach	Managerial approach
Size --Large --Small	 Negative Positive	 Positive Negative
Dividend pay-out ratio --High --Low	 Negative Positive	 Negative Positive
Exchange listing --OTC firms --Non-OTC firms	 Positive Negative	 Negative Positive
R and D to sales ratio --High --Low	 Positive Negative	 Negative Positive

Table 2: Firm characteristics and investment

	All firms	Size of the firm		Exchange listing		R and D to sales ratio	
		Small	Large	OTC	Non-OTC	Low	High
NT	11457	5738	5719	1824	9633	3155	4197
Q	0.0004 (2.88)	0.0002 (1.67)	0.006 (9.35)	0.002 (1.04)	0.005 (9.75)	0.005 (4.11)	0.001 (4.35)
S/K	-0.003 (-2.45)	-0.001 (-0.68)	-0.014 (-6.27)	-0.00001 (-0.002)	-0.008 (-5.70)	-0.014 (-4.98)	0.002 (0.91)
CF/K	0.076 (12.95)	0.056 (8.17)	0.146 (11.00)	0.036 (3.73)	0.112 (12.97)	0.148 (8.15)	0.024 (4.84)
Adjusted r^2	0.036	0.033	0.075	0 031	0.054	0.051	0.047

Notes: Q is the ratio of the market value to replacement costs, S/K is the ratio of sales to capital stock, CF/K is the ratio of cash flows to capital stock.
The cash flow measure includes R and D expenditures when the sample is divided on the basis of the R and D to sales ratio.
The regressions include fixed firm and year effects.
t-statistics are shown in parentheses.

Table 3: Internal finance and investment: Regressions with interactions

	Size of the firm		Exchange listing		R and D to sales ratio	
NT	11457	11457	11457	11457	11457	11457
Q	0.0004 (2.88)	0.0004 (2.90)	0.0004 (2.88)	0.0005 (3.57)	0.0004 (2.97)	0.0004 (2.95)
S/K	-0.003 (-2.45)	-0.003 (-2.65)	-0.003 (-2.45)	-0.005 (-3.53)	-0.003 (-1.58)	-0.003 (-1.62)
CF/K	0.076 (12.95)	0.073 (12.43)	0.076 (12.95)	0.128 (15.29)	0.061 (9.73)	0.061 (9.75)
Size*(CF/K)		0.0002 (7.13)				
Exch.list.* (CF/K)				-0.087 (-8.70)		
R and D* (CF/K)						0.000001 (0.66)
Adjusted r^2	0.036	0.040	0.036	0.042	0.043	0.043

Notes: Q is the ratio of the market value to replacement costs, S/K is the ratio of sales to capital stock, CF/K is the ratio of cash flows to capital stock. (Size*CF/K), (Exch.list.*CF/K), and (R and D.*CF/K) are interaction terms.
The cash flow measure includes R and D expenditures when the sample is divided on the basis of the R and D to sales ratio.
The regressions include fixed firm and year effects.
t-statistics are shown in parentheses.

Table 4: Internal finance and investment: Regressions with interactions

	I	II
NT	7352	7352
Q	0.0004(2.97)	0.0005(3.53)
S/K	-0.003(-1.58)	-0.004(-2.48)
CF/K	0.061(9.73)	0.124(12.06)
Size*(CF/K)		0.00002(5.37)
Exch.list.*(CF/K)		-0.092(-8.17)
R and D*(CF/K)		-0.0001(-1.97)
Adjusted r^2	0.043	0.057

Notes: Q is the ratio of the market value to replacement costs, S/K is the ratio of sales to capital stock, CF/K is the ratio of cash flows to capital stock. (Size*CF/K), (Exch.list.*CF/K), and (R and D.*CF/K) are interaction terms.
The cash flow measure includes R and D expenditures in the (2) regression.
The regressions include fixed firm and year effects.
t-statistics are shown in parentheses.

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